

REMARKS

Upon entry of this amendment, claims 55-58, 61-63, 126-129, and 182 will be pending. Claims 55-58, 61-63, and 126-129 have been amended, claim 53, 54, 59, and 60 canceled, and claim 182 added by this amendment.

Section 112

Applicants respectfully request reconsideration of the rejection of claims 58 and 62 under 35 U.S.C. § 112, second paragraph, as failing to satisfy the written description requirement. Claims 58 and 62 have been amended to more clearly describe the invention, thereby overcoming the rejection. Accordingly, Applicants request the rejection be withdrawn.

Section 102

Applicants respectfully request reconsideration of the rejection of claims 55, 61, 63, 126, 127, and 129 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,746,942 (Yamaguchi). As amended, claims 55, 61, 63, 126, 127, and 129 recite a semiconductor thin film including an insulating base and a single crystal thin film formed on the insulating base by heat treating an amorphous semiconductor thin film to form a polycrystalline thin film having polycrystalline grains aligned in an approximately regular pattern forming initial micro-projections by uplift of some of the polycrystalline grains at a boundary position among at least three of the polycrystalline grains by collisions amongst the polycrystalline grains and by heat treating the polycrystalline thin film, the single crystal thin film having resulting micro-projections formed on a basis of some of the initial micro-projections.

Yamaguchi discloses a semiconductor device including an insulating substrate 1 and a polycrystalline layer 2. See Fig. 1. The polycrystalline layer 2 of Yamaguchi is etched to form projections S1. See column 7, lines 28-41. Yamaguchi does not disclose a semiconductor thin film including an insulating base and a single crystal thin film formed on the insulating base by heat treating an amorphous semiconductor thin film to form a polycrystalline thin film having polycrystalline grains aligned in an approximately regular pattern forming initial micro-projections by uplift of some of the polycrystalline grains at a boundary position among at least three of the polycrystalline grains by

collisions amongst the polycrystalline grains and by heat treating the polycrystalline thin film, the single crystal thin film having resulting micro-projections formed on a basis of some of the initial micro-projections.

Regarding the claimed projections, the Office Action, with respect to previous claim 60, asserts that Yamaguchi discloses forming projections by uplifting boundary portions at column 7, lines 50-60. However, this section of the reference refers to formation of a second layer 4 and not the projections S1 of the first polycrystalline layer 2 and the balance of the reference fails to disclose projections like those claimed. Further regarding the recited projections, the Office Action, with respect to claim 126, asserts that the projections S_{n-1} of Yamaguchi are formed at a boundary position among at least three polycrystalline grains, citing Fig. 2f. However, the projections S_{n-1} of Yamaguchi are not formed by uplifting polycrystalline grains at a boundary position among at least three of the polycrystalline grains by collisions amongst the polycrystalline grains, as currently claimed. Moreover, as described above, Yamaguchi expressly states that the projections S1 are formed by etching the polycrystalline layer 2 (see column 7, lines 28-41) and thus not by uplifting a boundary position, as claimed.

In addition, as illustrated in the immediately preceding paragraph, the Office Action asserts that two different elements (S1 and S_{n-1}) of the reference qualify as the same feature (i.e., the initial micro-projections) of the claims. However, the projections S_{n-1} is formed as seeds for single crystals 10 and a polycrystal 11. For consistency, the Office Action would need to show that the protrusions S1 of Yamaguchi have all of the characteristics of the claimed initial micro-projections or that the protrusions S_{n-1} have all of the characteristics of the claimed initial micro-projections, neither of which is the case. Moreover, the reference does not disclose resulting micro-protrusions as claimed.

Because the reference does not disclose every feature of the claims, the rejection is improper. Accordingly, Applicants request the rejection be withdrawn.

Section 103

Claims 55, 56, and 128

Applicants respectfully request reconsideration of the rejection of claims 55, 56, and 128 under 35 U.S.C. § 103(a) as being unpatentable over Yamaguchi. As an initial

matter, the rejection is improper because claims 55, 56, and 128 depend from claim 126, which was improperly rejected as shown above. Yamaguchi also fails to suggest the previously noted elements of claim 126. Claims 55, 56, and 128 contain further allowable subject matter.

Further regarding claim 55, the projections S1 of Yamaguchi are 0.3 micron. See column 7, lines 38-41. The large size of the projections S1 of Yamaguchi is limited from being smaller by being formed by etching. As described above regarding claim 126, Yamaguchi does not disclose or suggest projections formed by uplifting grains in a polycrystalline thin film, which allows for projections having a height of 20 nm or less. See page 32 of the specification of the present application. Yamaguchi does not disclose or suggest projections sized as claimed and the projections S1 of Yamaguchi either cannot be formed as small as the projections of the present invention by the etching process of Yamaguchi or it would be prohibitively difficult and expensive to form projections as small as the claimed projections by etching. Accordingly, it would not have been obvious to one skilled in the art at the time of the present invention to form a crystal film having projections sized as claimed in light of Yamaguchi.

Further regarding claim 56, because Yamaguchi fails to disclose or suggest resulting micro-projections formed on the basis of initial micro-projections, the reference fails to disclose or suggest resulting micro-projections having a diameter of about 0.1 μm or less.

Further regarding claim 128, because Yamaguchi fails to disclose or suggest a semiconductor thin film as recited in claim 126, the reference fails to disclose or suggest such a semiconductor thin film having a thickness of about 50 nm or less.

Because the reference does not disclose or suggest every feature of the claims, the rejection is improper. Accordingly, Applicants request the rejection be withdrawn.

Claim 57

Claim 57 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamaguchi as applied to claim 53 above and further in view of U.S. Patent No. 5,817,173 (Nakata). As an initial matter, the rejection is improper because claim 57 depends from claim 126, which was improperly rejected as shown above. Yamaguchi also fails to suggest the previously noted elements of claim 126. Claim 57 contains

further allowable subject matter. Claim 57 recites, in part, a semiconductor thin film wherein a radius of curvature of the resulting micro-projections is about 60 nm or more.

Yamaguchi discloses a semiconductor device including an insulating substrate 1 and a polycrystalline layer 2 wherein the polycrystalline layer 2 of Yamaguchi is etched to form projections S1 having pointed tops. See Figs. 1 and 2b-2f and column 7, lines 28-41. Nakata discloses a crystal substrate 30 including squared projections 32. The projections S1 of Yamaguchi are not the same or similar to the claimed subsequent projections because the projections of Yamaguchi are pointed and, therefore, do not have a radius of curvature. The projections 32 of Nakata are not the same or similar to the claimed subsequent micro-projections because the projections of Nakata are square (see Nakata, column 10, lines 15-17) and, therefore, do not have a radius of curvature. Further, the projections 32 of Nakata are part of a crystal substrate or base 30 and not part of a single crystal thin film formed on a base, as claimed regarding the resulting micro-projections.

Because the references do not disclose or suggest every feature of the claim, the rejection is improper. Accordingly, Applicants request the rejection be withdrawn.

Conclusion

As it is believed that the application is in condition for allowance, a favorable action and a Notice of Allowance are respectfully requested.

Applicants believe there is no fee due at this time. However, the Commissioner is hereby authorized to deduct any deficiency or credit any overpayment to Deposit Account No. 19-3140.

If the Examiner desires, Applicants welcome a telephone interview to expedite prosecution.

Respectfully submitted,

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